MFRC FINAL REPORT

Title of Project: Validation of Y-PLEX 12 Database Study (MFRC03-01)

Principal Investigator(s):

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Abstract:

Validation addressing the required components as recommended by the DAB for the purpose of expanding the U.S. Caucasian, African-American, and Hispanic Y-STR database presently maintained by Reliagene Technologies, Inc. and for use in forensic casework.

Discussion:

DNA analysis conducted on evidence from criminal sexual assault cases is routinely used in forensic laboratories across the country. The interpretation of DNA data on cases where more than one semen donor is detected is very difficult, due in part to the lack of automated techniques for the separation of female victim DNA from male sperm DNA. The interpretation of mixture cases has become more common and complex. A means by which to resolve mixed DNA profiles in sexual assault cases is the use of Y-Chromosome STR in DNA analysis.

One of the initial objectives of this project, involved the evaluation and validation of commercially available Y-STR systems which could be used to resolved mixed DNA profiles in sexual assault cases. The Illinois State Police Research and Development Laboratory completed the validation of the Reliagene® TechnologiesY-Plex 5 and 6 amplification kits prior to receiving funding from the MRFC for this project. The ISP utilized the funding to complete another component of this project: the validation and generation of a population database for Y-Chromosome STRs in the three major population categories: African-American, Caucasian and Hispanic.

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In order to implement the use of Y-STRs in forensic casework, population data for the various loci needs to be collected to establish a population database. Increasing the size of an existing population database adds statistical weight to the frequency of Y-STR profiles that can be reported in forensic casework. At the present time, the only statistical evaluation that can be conducted to give weight to a DNA match is the counting method. The statistical value obtained from the counting method is dependent on the number of samples that have been analyzed; therefore it is imperative to have a large population database. These databases can only be generated by evaluating a large number of samples in three major categories: African-American, Caucasian and Hispanic.

As a result of Mr. Frank's initial validation of Reliagene® Technologies Y-Plex 5 and 6 amplification kits, the ISP Research and Development Laboratory began offering Y-STR analysis services on a case-by-case basis in October 2003. For this project, William Frank collected and analyzed approximately 450 samples from the three major population categories utilizing the Reliagene® Technologies Y-Plex 12 amplification kit. The resulting profiles were added to an existing population database maintained by Reliagene Technologies. The inclusion of this additional data to the established Y-STR haplotype reference database will allow forensic laboratories to utilize Y-STR analysis in forensic casework.

Mr. Frank is still in the process of collecting and reviewing data for the Y-Plex 12 validation. Upon completion of his review, Mr. Frank will submit the results of the population database validation study to the *Journal of Forensic Sciences*. The Illinois State Police greatly appreciates the monetary support provided by the MFRC for this project.